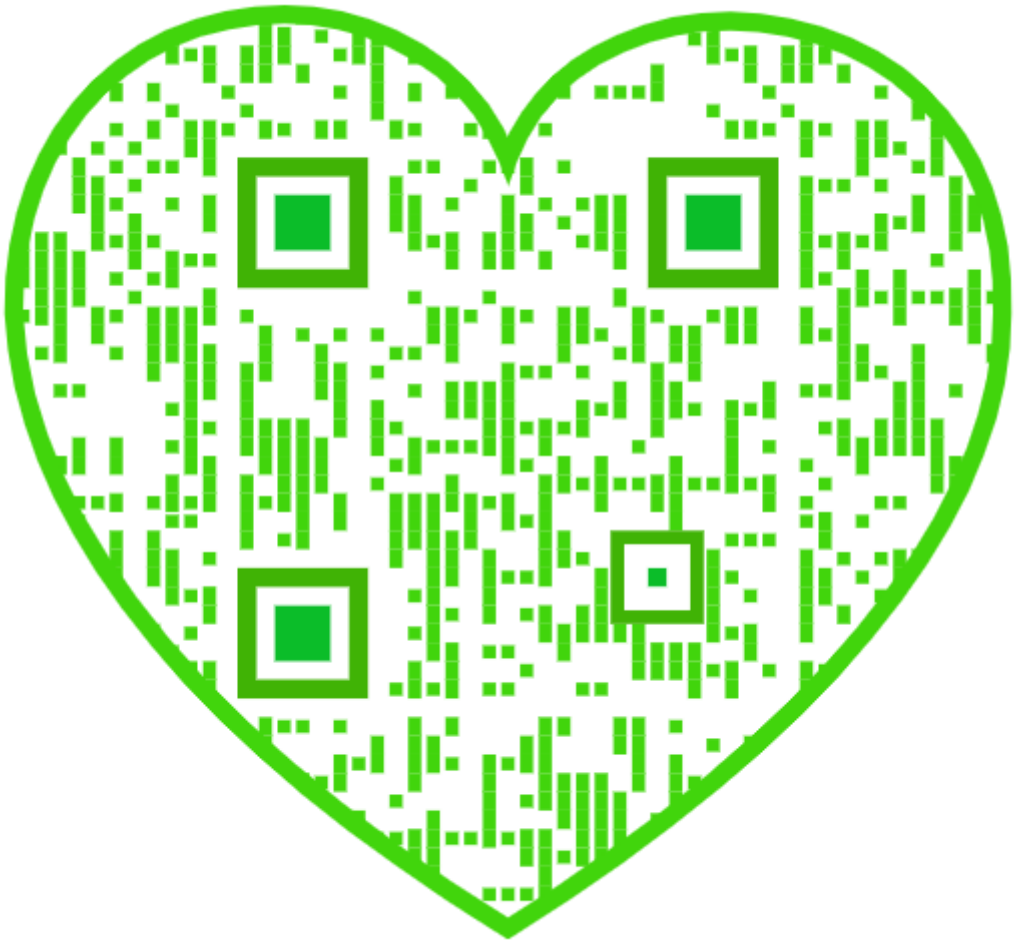
Bee-keeping in the West Indies

W. K. Morrison



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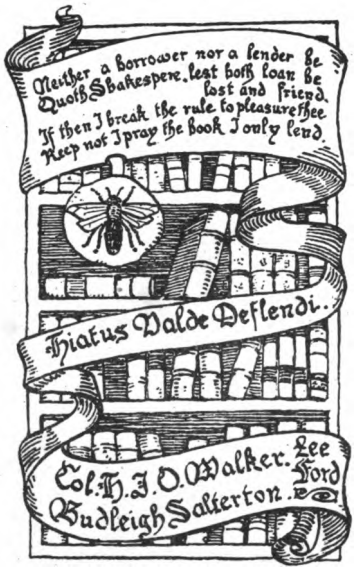
Neither a borrower nor a lender be
Quoth Shakespere. least both loan be
lost and friend.
If then I break the rule to pleasure thee
Keep not I pray the book I only lend.
Hiatus Valde Deflendi.
Col. H. J. O. Walker. Lee
Budleigh Salterton. Ford

IMPERIAL
DEPARTMENT
OF
AGRICULTURE
FOR THE WEST INDIES.
IMPERIAL DEPARTMENT OF AGRICULTURE
BEE-KEEPING
IN THE
WEST INDIES.
ISSUED
BY THE 1901. COMMISSIONER

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No. 9.

IMPERIAL

DEPARTMENT OF AGRICULTURE

FOR THE WEST INDIES

BEE-KEEPING

IN THE

WEST INDIES.

BY W. K. MORRISON.

ISSUED BY THE COMMISSIONER OF AGRICULTURE.

1901.

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PREFACE.

Bee-keeping is one of the most promising of minor industries in certain parts of the West Indies. It is an interesting occupation suited to all classes of the community. The labour connected with it is light, it can be carried on under shade and the profit arising from it, when intelligently pursued, would form an appreciable addition to the income of persons with slender means.

Also the capital required to make a start is small and, in the West Indies, the bee-keeper has not long to wait for a crop.

The Imperial Department of Agriculture has taken an active part in bringing bee-keeping under the notice of the people in the Lesser Antilles. In the first place it engaged the services of a competent Bee-expert to visit the several islands, to give addresses, to advise and assist bee-keepers and generally to encourage right methods of treating the bees and obtaining honey of high quality.

The Expert engaged was Mr. W. K. Morrison, formerly connected with the United States Department of Agriculture. He visited the several islands in 1901 as follows:—

Barbados, January 1 to 21, Dominica, January 22 to February 5, Montserrat, February 6, to 20, Antigua, February 20, to 27, Grenada, March 16 to 29, St. Vincent, March 24 to April 12, St. Lucia, April 24 to May 10. After each visit a report on the condition and prospects of bee-keeping in each island was published in the *Official Gazette* and distributed for general information.

After a careful study of the circumstances Mr. Morrison is of opinion that the outlook for bee-keeping in the West Indies is very encouraging. At present, with the single exception of Jamaica, a bee-keeping industry can hardly be said to exist. At Grenada, St. Vincent, Barbados and Antigua a few bee-keepers were met with but in the other islands, as at St. Lucia and Dominica, with an abundance of honey-bearing flowers to be found all the year round, little or no attention had been devoted to bee-keeping.

In the following pages an attempt has been made to place in the hands of those desiring to become bee-keepers hints and suggestions exactly suited to the requirements of the tropics, expressed in popular language. By the courtesy of the A. I. Root Company illustrations are given of the more important appliances required for use by bee-keepers. Next, lists are given of the principal books and journals on bee-keeping of the addresses of hive manufacturers, breeders of Italian queens and dealers in honey and wax. There is also a list of the principal bee-flowers of the West Indies and a glossary of terms connected with bee-keeping.

In order to assist beginners sample orders are given for outfits for one up to twenty-five hives with prices in each case.

The Curators of Botanic Stations and other officers of the Department will gladly afford any further information that may be desired.

It only remains for me to express the earnest hope that the Pamphlet now issued will serve the objects in view and that a bee-

keeping industry of a thriving and permanent character will before long be established in these islands.

D. MORRIS,
Commissioner of Agriculture
for the West Indies.

August 3, 1901.

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BEE-KEEPING

IN THE

WEST INDIES.

The industry of bee-keeping is an old one, dating back thousands of years to the time when Eastern nations practised it with intelligence and care. Among European nations it has long been held in esteem and is encouraged and fostered in all agricultural communities.

The fact that honey is so universally held in esteem in Europe is of value here as showing that a ready market exists for all the good honey likely to be produced in the West Indies. At the present price of honey in Europe the consumption is necessarily limited, but honey produced and sold at lower rates would lead to a very largely increased consumption. This is fully confirmed by the experience of Jamaica and Cuba at the present day.

The same remarks apply to bees-wax, an

article in great demand for which no efficient substitute has, probably, yet been discovered. We may reasonably conclude that the market for honey and wax is practically unlimited and it is the opinion of many competent people that bee-keeping is on the verge of a very considerable development.

In Cuba, honey is produced at a cost not exceeding two cents per pound and it may thus be seen that West Indian bee-keepers can compete with the jam makers of the old world if only they will make good use of their opportunities.

Amongst the people of the United States a large amount of honey is produced and consumed and the same is true of Canada, though in both countries great efforts have been made by adulterators to injure the industry. It has even been stated in newspapers that comb-honey was made by machinery and was indistinguishable from the genuine article. Such a statement is entirely erroneous but in some cases it may have discouraged bee-keepers. Even liquid honey cannot profitably be prepared artificially and its adulteration is easily detected.

Bee-keeping has been greatly improved by the inventions and improvements made during the last half-century. Most of the modern improvements have been recently adopted in Jamaica and Cuba with great success. In Cuba very large yields of honey have been reported, produced under American management, and in Jamaica as shown in the *West Indian Bulletin* Vol. i., pp. 305–9 the present industry is of considerable value. The outlook for bee-keeping in the West Indies is a very promising one and at present we are far more likely to under-value than to over-estimate its importance as a source of wealth. When the West Indian conditions are rightly understood we may expect a substantial increase in the honey crop. Hitherto too much reliance has been placed on the methods in vogue in cold climates where the conditions differ very widely from those obtaining in the tropics.

Roughly estimating the yield of honey at say £10 per square mile, the output of honey from the West Indies should amount to several hundred thousand pounds, especially if the fine honey-bearing flora of

some of the islands, be fully utilised. The capital required to make a start is small, and it is well known that the West Indian bee-keeper need not wait long for a crop.

Numerous experiments and observations need however to be made before the industry here will be on such a sound basis as it is in northern climates; but the industry is already so strongly rooted in some of these islands that it is not likely in any case to be diminished. In a few years there should be such an array of observed facts with regard to the treatment of bees under tropical conditions that improvement is bound to result. It will be necessary, however, to maintain throughout a high standard of excellence so that European markets will always be open at remunerative prices. The great danger to West Indian bee-keeping will probably lie in the tendency to ship abroad honey or wax of an inferior quality. Jamaica has already attained a high position in the honey and wax market and it is hoped that the Lesser Antilles will emulate or surpass Jamaica's position. That the West Indies can produce honey of the very finest quality is evident

from the following opinion of Mr. A. I. Root, one of the greatest living authorities, on samples of Jamaica logwood honey sent to him by Messrs. Hooper Brothers of Kingston. "In looks it certainly compares favourably with anything we can produce here in America. On breaking the comb we find the honey very thick, of a beautiful crystalline amber; and when one tastes it, he utters an exclamation of surprise and pleasure—at least I did. Logwood honey is uniike anything else. The flavour is peculiar, suggesting something between violets and geraniums—at least the honey seems to taste somewhat as violets and geraniums smell; and yet the distinctive flavour is not strong enough to cause one to tire of it. My impression is, that if this honey were on sale in some of the cities in the United States and if customers were allowed a taste of it, it would all go off at fancy prices. Not everybody may think as much of it as I do; but if all logwood honey is like the sample sent us I predict it will rank side by side with the choicest products of the 'mountain sage' or of the clovers."

Care and attention should place West Indian honey in the front rank in European markets, both in quality and quantity, and no competition need be feared so long as a sound and attractive article is produced.

SUCCESSFUL BEE-KEEPERS.

The question naturally arises, who are likely to develop the bee-keeping industry of the West Indies and what class of people should take it up as a serious occupation. This is best answered by stating who are the most successful in other lands. On the American continent the most successful bee-keepers are professional men, lawyers, doctors, dentists, schoolmasters, and graduates of colleges, while there is a large number also to be found in the ranks of farmers. It is usually considered that a person who has some taste for natural history and a predilection for mechanics has the best chance of success. The latter is an important qualification for a bee-keeper, as all expert bee-keepers are clever at making tools and minor appliances to assist them in their work. A certain amount of business tact is also

required to reap the full measure of success, for after producing a crop of honey and wax there is still the task of selling it to the best advantage. Some bee-keepers wholly fail in this part of the work. The best remedy is to read the literature on the subject of selling to be found in the pages of the bee journals.

Both in Europe and America many clergymen are engaged in bee-keeping as a means of augmenting a scanty income and giving them agreeable outdoor exercise. Schoolmasters are particularly well situated for engaging in bee-keeping. Medical men generally take to bee-keeping as a pleasant hobby; the celebrated surgeon John Hunter setting them an example, for he discovered how wax was produced when he had been advised to take up some hobby to keep his mind from the engrossing cares of his profession. Europeans, especially ladies, who wish to supplement their income in the West Indies will find bee-keeping a pleasant occupation. The work can be carried on in the shade. In addition, the various operations are interesting and not laborious, and in the

case of a large apiary, with the assistance of a boy to do the rougher work, a European lady can supervise and look after bee-keeping in the tropics with little or no fatigue.

In America there are many instances of women of refinement engaging in bee-keeping with success, and in Jamaica we have heard of at least one lady who has done and is doing well. "A lady in Vere, in Clarendon parish, last season produced over 10,000 pounds of extracted honey. She had only been in the bee-business a little over 18 months. Several times she became discouraged, but, being a plucky little woman, she was determined to go on 'for one more season.' Ultimately she extracted over 10,000 lbs. from 30 colonies of bees. I may mention that a 'colony' of bees is a brood nest and as many 'supers.' or surplus boxes as may be needed. This lady used as many as five 'supers.' She lives in an ideal location—mangrove on one side with logwood and other honey-producing plants and trees on the other. I claim for this lady and Jamaica the largest average crop of honey from a given number of hives pro-

duced anywhere in the world." * Planters, large and small, will understand that the industry is suitable for them and whenever their sons or daughters show a liking for it, they should encourage their bent. Probably the most prominent quality required of a bee-keeper is perseverance, for at the start some rebuffs and disappointment must be expected. The man or woman who perseveres in spite of rebuffs is bound to succeed and it is just as well for the rest of the bee-keepers that some persons are easily discouraged. Stings frighten many persons out of the business, though by the exercise of patience these drawbacks could be overcome till all fear from this source has vanished. It is only the careless or ignorant bee-keeper who gets stung, so that the remedy is obvious enough.

HINTS TO BEGINNERS.

1. Buy your hives, after the first, packed flat and nail them together yourself.
2. Paint the exposed portions of the hives and the edges where parts

* *West Indian Bulletin*, Vol. I., p. 307.

come together with white paint.

3. Select a suitable place, and erect stands to keep the hives about two feet above the ground (p. 13).

4. Fit the comb foundation into the frames. (p. 48).

5. Buy healthy bees; two swarms will be sufficient to start with. (p. 24).

6. Introduce the bees into the hive, following carefully the directions on pages 24 to 26.

7. In windy localities place a heavy stone on the cover of the hive.

8. Keep a sharp look-out for signs of swarming.

9. Keep one or two empty hives ready to receive new swarms.

10. Do not try to increase your stock of bees by artificial swarming. You will almost certainly fail.

11. Do not proceed too fast. Learn all you can, and do not buy many hives

until you have mastered the management of bees.

12. Do not expect large yields of honey until you have become an expert. The yields depend on you, not on the bees.

13. If some one else keeps bees in your locality maintain good terms with him and learn all you can. The most ignorant bee-keeper can sometimes give you a good hint.

14. In reading foreign books about bees remember that they are intended probably for cold countries.

15. Remember always to order large hives for any island in the West Indies, except Barbados.

16. Try first of all to sell your honey in your own neighbourhood.

WHERE BEES MAY BE KEPT.

Bees are profitably kept in many situations provided there is abundance of food

and the following points are observed. Hives should not be placed in such a position that the bees, flying home, laden with nectar, have to pass over a large body of water. A safe plan is to place the hives about one or two miles from any large body of water such as a river, lake or arm of the sea. A distance of at least 100 feet should be allowed between a hive and any frequented highway, unless a closed fence, 6 feet or more in height, intervenes. It is also undesirable to keep hives in places frequented by cattle or horses. An ideal place is under an open-sided thatched shed or under a large mango or other good shade tree. Very tall trees are not suitable for shading hives. A rough trellis covered with creepers forms an excellent shelter.

A long thatched shed will be found serviceable where many hives are kept, and would also serve to protect the bee-keeper from the weather when he is at work. It is a common practice in Cuba to use such a shed, which is frequently provided with a floor and a room at one end where tools and appliances are stored. For a few hives a simple thatched shed will be sufficient. In

erecting such a shed, care must be taken to build it with its length running due north and south. The early morning sun then strikes the front of the hive and the setting sun strikes the back, whilst the hives are fully protected during the heat of the day. *It is an axiom in West Indian bee-keeping to face hives to the morning sun.*

Where frogs or toads are common, it would be always desirable to raise the hives about two feet from the ground.

THE BREEDS OF BEES.

Modern books treat only of one species of bee, *Apis mellifica*, thus giving the impression that there is but one kind of domesticated bee. This is by no means the case. There are in India at least three distinct species of bees capable of domestication. It is possible that one or more of these bees could be profitably introduced into the West Indies, especially where a large production of wax is desired. In Brazil several species of stingless bees exist, as also in some West Indian islands.

With regard to the ordinary hive bee, there are numerous distinct races. The most common is the blackish-brown bee from northern Europe which has been introduced into America. Next to this is the yellow Italian bee, sometimes, misleadingly, termed the Ligurian bee; this is admirably adapted to a semi-tropical country. The Dalmatian bee very closely resembles the Italian and is of a good race. The Cyprian is likely to do well in the West Indies, as also is the Syrian or Palestine bee, which is closely related to the former. The latter can seldom be obtained in a pure state and the choice of a race for the West Indies is practically limited to the Italian, which is also the one best suited to local conditions.

Books and journals refer commonly to "hybrids." These are simply crossbred bees, obtained from the ordinary black and the Italian bee. They are excellent workers, better than their parents, but they have a tendency to deteriorate, becoming darker with each succeeding generation.

One breed of bees only should be kept, and if possible all the bees in one neighbour-

hood should be of the same race. Bees can only be kept up to the best standard by keeping an accurate record of the breeding of the queens. This is essential to success. Queens which show signs of possessing energy and stamina, and are also prolific, should be used for breeding purposes. The characteristics of the queen are sure to manifest themselves in the progeny of workers, hence the importance of securing a queen of the best quality.

THE BEES OF A HIVE.

There are three kinds of bees in a hive, (1) the drones, (2) the queen and (3) the workers. The drone is the male bee, whose function is to mate with the queen; it may be recognised by its large size, and greater breadth. The eyes are also much larger, and the general build is heavier than that of the queen or workers. The queen is often aptly termed the mother, her functions being mainly maternal. The queen is larger than the worker, longer and more slender than the drone; she mates once only, a few days after she is fully grown. Mating takes place in the air, the drones and queen flying some

distance from the hive. The queen subsequently settles down in the hive, the workers taking every care of her, as they know her value. Workers are imperfectly developed females; they are smaller than both the queen and the drone, and do practically all the work of the hive.

When the queen is settled in the hive after mating, she commences to lay eggs in the brood comb. Eggs are of two kinds, male and female. Male eggs, which give rise to drones, are unfertilised. The queen is apparently able to control the production of male eggs. An unfertilised queen will lay only male eggs. Fertilised eggs always develop into either queens or workers, according to the treatment they receive from the bees. When the egg hatches, the grub, if destined to be a queen, is fed on a special food, and if an egg laid in a worker cell is intended to become a queen, the bees will build a larger cell, termed a "queen cell", by tearing down the neighbouring cells and building up one about the colour and shape of a pea-nut. In this the the grub floats in "pap," absorbing the latter through the mouth and skin. The

food given to these grubs hastens development and increases their size. After sixteen days a fully developed queen emerges, having passed through the chrysalis stage sealed up in the cell.

In the case of workers, similar eggs are dealt with, but the food is much poorer in quality. In the grub stage, the worker is "weaned" and the style of food given to it is not nearly as rich in protein as is the "royal jelly" given to queen grubs. After twenty-one days, the worker emerges from the cell. Drones develop in cells intermediate in size between worker and queen cells, and require a period of twenty-four days.

Workers sometimes lay eggs (especially if the only queen in the hive dies) and these eggs, being unfertilised, always develop into drones. Laying workers are regarded with disfavour by the bee-keeper, as he may see the eggs laid and erroneously conclude that the queen is laying. A sharp look-out should be kept for laying workers.

Should the queen die when there are

fertilised eggs in the hive, the bees proceed at once to raise queens by altering the food and giving a certain number of the grubs "royal jelly."

HIVES.

There is always much eager discussion over the choice of a hive. In this case it is better to follow the lead of the great majority of bee-keepers and to adopt the improved Langstroth hive. This has the same general dimensions as the hive invented by Mr. Langstroth and has the great advantage of being the *standard* size. To a beginner this is of great importance, his hive and fixtures being low in price and always saleable. The necessity to a beginner of purchasing these hives and fixtures cannot be too strongly emphasized. There are many good hives for special purposes, such as the Heddon, Danzenbaker, and Quinby, but the Langstroth is an all-round hive suited to any purpose. Since there is no patent in it, anyone is at liberty to make it, and it is manufactured in such vast quantities that it is cheap and easily procurable.

There are slight points of difference in this hive as made by different dealers. The simplest and probably the best is the 'dovetailed,' deriving its name from the method used to unite the various parts.

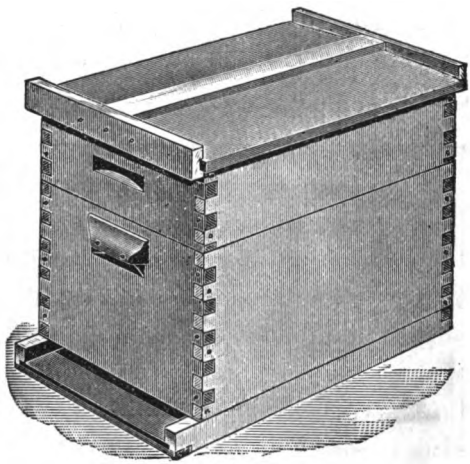


Fig. 1. "Dovetailed" Standard Hive.

The distinctive features of these hives are the hanging frames, of which there are ten in a standard hive; each frame holds one comb, the frame being $17\frac{3}{8}$ inches long by $9\frac{1}{8}$ inches. The outside dimensions of a ten frame dovetailed hive are 20 inches in length, by 16 inches in breadth, and 10 inches in depth. During the honey season two of these hives are used, one above the other, the top being moveable to admit of it. In this case there will be 20 frames in use, ten

in the lower chamber for breeding purposes and 10 in the upper for honey. When "comb honey" is desired, the upper hive is divided into two half stories or "supers;" thus a complete hive would have one 10 frame hive below for breeding, and two half-story supers above for comb honey. In the West Indies it will be advisable to have three supers one above the other, and there is no reason why there should not be so many as half a dozen supers, one above the other, when honey is plentiful.

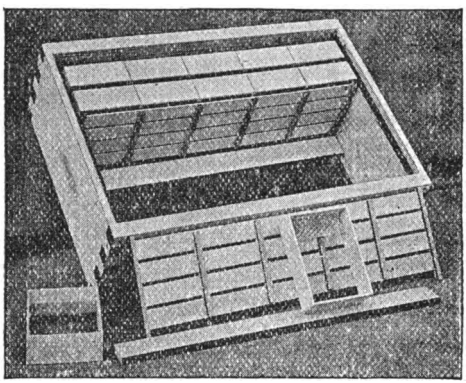


Fig. 2. A "SUPER."

With Sections partly removed.

The bottom of the hive is simply a board with a raised rim on three sides. The hive stands on the rim, having on one side a

narrow platform for the bees to alight upon and pass in and out. The top of the hive is simply a flat board, made water-tight and braced to prevent warping.

The frames inside the hive contain each one comb ; a single comb is $\frac{7}{8}$ inch thick and the space between the combs is usually $\frac{1}{8}$ inch ; thus each frame occupies a space of $1\frac{3}{8}$ inch, that being the distance from the middle of one comb to the middle of the next. These measurements apply to the lower or brood chamber only. In dealing with the upper chamber different measurements may be adopted. If liquid (extracted) honey is desired, the usual plan is to adhere to the same measnrements as in the the brood chamber below. If comb honey is desired, small frames are used, called "sections." Their size is usually $4\frac{1}{4}$ by $4\frac{1}{4}$ inches. Eight sections occupy the space of one frame and each holds one pound of comb

Fig. 3. "Sections."

The two sections on the left are plain. The single one on the right is a section with bee-way.

honey. Various forms of sections are seen in Fig. 3.

Sections have no shoulders by which they may hang, so that it is necessary to provide the super with section holders. These are shallow frames without tops, serving to keep the sections from falling out of the super. Between the rows of sections, thin boards (separators) are placed to compel the bees to build the comb in the most regular manner.

In speaking of frames throughout this pamphlet, frames of Langstroth size and style are referred to. The one in general use at present is the Hoffmann frame, which differs from the old Langstroth only by the addition of projections on the end bar $1\frac{3}{8}$ inches in breadth. The value of these lies in the fact that the bee-keeper simply presses the ten frames of the hive together and thereby insures their being correctly spaced. The objection to these is that the bees glue them together where the projections touch, but the correct spacing attained by their use is of sufficient value to the beginner to warrant their adoption. In the staple-spaced frame, these projections are replaced by wire staples;

these are more easily handled than Hoffmann frames, especially in the West Indies, where "bee glue" is abundant. Those bee-keepers who have a few hives will find the Hoffmann frame the most

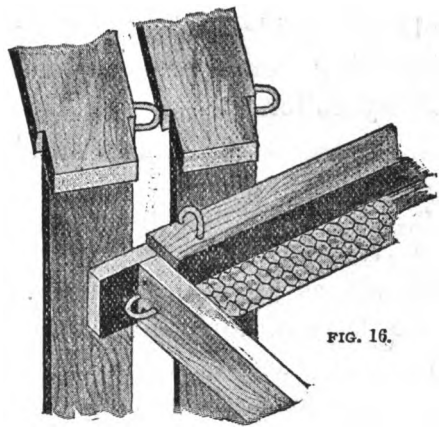


Fig. 4. THE STAPLE SPACED FRAMES.
Two are in position, whilst the third is detached.

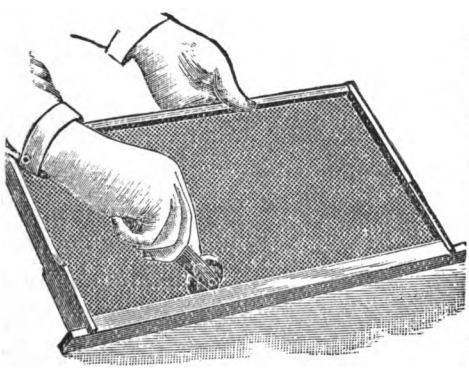


Fig. 5. HOFFMANN FRAME.
To illustrate also the method of inserting comb foundation.

suitable whilst the expert with hundreds of colonies will prefer the staple-spaced frame. The annexed illustration (Fig. 5) of the Hoffmann frame is

placed upside-down to show the method of inserting comb foundation by means of a Daisy roller.

BUYING BEES.

The beginner may be perplexed at first as to obtaining bees, especially in such islands as Dominica and St. Lucia where no bees have hitherto been kept on a large scale. In such cases it would be best to send to Antigua for bees in Langstroth fixtures. The usual method is to put a small colony or swarm into a box with two or three frames of comb. The combs used should be old ones if possible, and if three combs are sent, the box should have room for six to allow for a large air space. The top and bottom of the case should be of wire cloth. Directions should be clearly marked on the case to keep it in a dark place while it is on the ship, or wharf. Before shipping it is advisable to see that the frames cannot become loose during transit. When the bees are landed at the wharf, the buyer should get them to their future home within as short a time as possible. If they arrive during the middle of the day, place the box in a cool, dark place until

an hour before sunset. Then, fully prepared with veil and smoker, the beginner should take the bees outside to the hive prepared for them. He should see that all nails in the case are loose to allow of easy removal. The box should then be placed on the top of the hive, and a hole should be opened at the side to allow the bees to escape. The bee-keeper must then go away, taking care not to move too quickly or to run away. After dark a board should be placed on the top to prevent rain getting in, and the bees should be left there for two days. After this time, the bee-keeper should go, armed with veil and smoker, and carefully place the frames in the new hive. The bees on the sides of the shipping box can be shaken out on to the alighting board of the hive, when they will run inside. The above is the safest and most humane method of transferring the bees, though not the quickest.

Where bees are kept in frame hives as in Antigua, and Grenada, the beginner is advised to buy bees locally. Montserrat and Dominica are so close to Antigua that swarms without combs may safely be sent. In

this case, shake the bees out of the shipping box on to the alighting board of the hive, doing this at six o'clock in the evening. During the night they will enter the hive, and any that cluster on the front of the hive may be brushed down with a feather.

It is sometimes possible to buy bees locally in a kerosene box. The buyer should then see that the bees are *not sent in a cart* but are carried on the head. The novice should not attempt to remove the bees from the box, but he should wait until the bees swarm, as they will probably throw out several swarms in quick succession.

The best method of obtaining bees is to buy swarms from a local bee-keeper, stipulating that the bees shall be delivered in a light box as soon as they are safely caught. The bee-keeper then has only to shake the swarm out of the box on to the alighting board of the hive, using a little smoke if necessary and doing this in the evening. The bees will soon run inside the hive, and those that cluster on the front of the hive may be brushed down with a feather. A good swarm should weigh at least four pounds.

BUYING QUEENS.

It is a very simple matter to buy queens and have them sent by post for journeys, even as long as 40 days. For the West Indies it is not necessary to pay more than one dollar for a queen unless the purchaser intends to breed queens for sale. In this case it would be advisable to import a queen from Italy. Cyprian and Holy Land bees are excellent but hard to find in a pure state. A dash of Cyprian blood in the Italian makes an excellent strain of bees for work in hot climates. Mr. B. F. Carroll of Texas obtained 690 pounds of honey in a year from a colony of pure Cyprian bees.

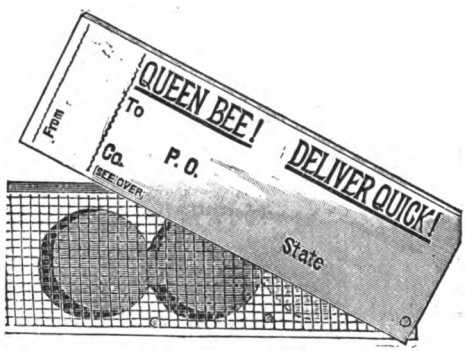


Fig. 6. THE BENTON CAGE.
For sending Queens by post.

If a fancy bee is wanted the Albino bee will serve the purpose Strictly speaking it is not an Albino, but simply a cream coloured

strain of Italian probably caused by an admixture of Cyprian blood. At the end of this pamphlet will be found the names of a few breeders of repute. There are many others. Care should be taken to ascertain that the breeder is reliable before sending money for queens; also that the strain offered is healthy and pure.

MANIPULATING HIVES.

When placing hives in position it is advisable to use a spirit-level to get them set perfectly level. The combs in such a hive will be perfectly perpendicular and much awkwardness will be avoided.

In order to have the combs solidly attached to all sides of the frame it is advisable to turn the hive upside down for two or three days, until the bees have attached the comb firmly to the bottom of the frame. Such combs are far stronger, and this is of especial importance in the West Indies. It is unwise to invert a hive too soon. Several months should elapse so as to allow the bees time to strengthen the combs by raising brood in them. When inverting a hive, act

as follows: (1) take off the top; (2) place two bars (of lath) or sticks across the comb frames reaching from side to side: (3) place the bottom on the top and the top on the bottom and tie the hive together with a rope; (4) now invert the hive by raising one *end* and turning it round. *Now turn a hive on its side.* Leave the hive thus for 72 hours. During this time the bees will firmly attach the comb to the bottom bar of the frames, giving the latter a far stronger hold.

In moving hives from one spot to another over a short distance, it is advisable to move the hive only a foot or so a day until it reaches its destination. Similarly if a hive facing West is to be turned to the East, it should be moved round no more than a couple of inches daily, until it faces in the right direction. If a number of hives are to be moved only a mile away, it is best to take half of them one week and the remainder the next week.

In moving hives three miles or more, all that it is necessary to do is to put a piece of wire cloth on the entrance and tie the hive securely together with a rope. Hives are

best carried by being "headed," and care should be taken to see that they are not set down in any other position than upright. Work of this kind can only be carried out at night.

TAMING BEES.

The fear of stings deters many people from bee-keeping as a pursuit; those who have sufficient "nerve" and a taste for the work soon learn not to fear stings, and a cool, collected bee-keeper has little to fear.

The following precautions will prove valuable to beginners and those unaccustomed to handling bees: Have a good smoker, well filled with dry wood; tie the legs of the trousers tightly at the bottom so that the bees may not be able to climb up. Wear a coat and either tie the wrists or wear gloves. If gloves are used cut off the

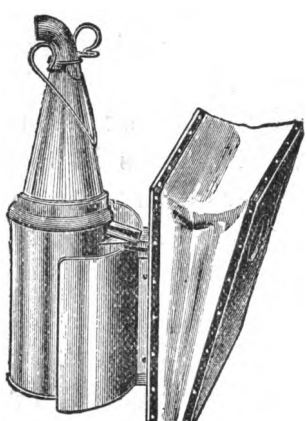


Fig. 7. THE BINGHAM SMOKER.

fingers. Wear a veil, as in Fig. 8, with a broad brimmed hat. Carry a screw-driver to assist in taking off the top of the hive which is often glued down by the bees. Approach the hive from behind. Give a few puffs of smoke at the entrance to drive in the "guard" bees. Do not jar or jerk the hive or anything containing bees. (This is the great art in handling bees.) Do nothing in a hurry. Prise off the top of the hive with the screw-driver, puffing in smoke as soon as possible.

Fig 8. THE PORTER BEE-VEIL.

Lay the roof in front of the hive so that any bees on it may run inside. Handle frames by the shoulders provided, *and never turn a comb on its side*, lest it fall out. If the queen is on a comb, handle it with great care. Never puff smoke right at the bees, and use as little as possible. Smoke frightens bees, which then gorge themselves with honey, so that they can live for several days if they have to leave the hive. If a colony is much disturbed by handling, leave it alone for a week, during which time they will forget. Be careful not to kill bees. Push the frames close together when the examination is finished. If once stung, do not run away, but should the bees get out of control slip behind a bush or fence. Then get the smoker well alight, return to the hive, blowing clouds of smoke round you, and thoroughly subdue the bees. It is an advantage to have someone to work the smoker.

If there is much difficulty in managing bees, it is advisable to see someone handle them who understands it. Anyone accustomed to bees can handle them to any extent and they can be managed exactly as

other animals. Beekeepers who get stung often get so callous that the stings do not hurt; this condition is reached by some people in a few weeks, and they can then handle bees without veil or gloves, using only a smoker. Ladies should wear a special dress, sold by the large dealers in hive appliances.

SWARMING.

Swarming is regarded with great interest by the novice, as he is often at a loss to account for it, but the experienced bee-keeper looks on it as a nuisance and hopes for a breed of bees that do not swarm or for a hive that prevents it. Swarming is the manner in which bees increase and spread. A hive with too great a number of bees becomes restless and the bees decide to divide. Accordingly they raise a few queens in anticipation of the event and when these are about half-grown, the old queen quits the hive with half the colony, leaving the remainder to care for the young queens. The emerging swarm, forming a mass as large as a man's head, usually clusters on the branch of a tree near by and scouts are sent out to find a hollow tree

where the swarm can seek a home in a day or two. The swarm should be caught at once. If the swarm is near the ground a kerosene box should be placed below and the swarm shaken into it. The box is then turned upside down and set within an inch of the ground. A new hive is prepared and the entrance raised so that the bees may easily get in. The bees are then jerked from the box on to the alighting board, and any that cluster on the front are brushed off. The bees will then run inside the hive and settle down. If you do not wish to start a new colony, the bees left in the old hive after the swarm emerged, may be transferred to the new hive with the swarm in the following manner:—Place the new hive (with the swarm in) on the stand of the old hive as close to it as possible. Take out the frames of the old hive and brush the bees off on to the alighting board of the new hive. They will then enter the new hive and the size of the swarm is practically doubled. If the new hive has been provided with frames of old comb, the queen will lay eggs in it and supers may be put on at once. If the new

hive has only foundation combs, it is better to wait 24 hours before putting on the supers, as the queen would then lay in the supers intended for honey and spoil them. The above process gives a strong colony of bees that will give their owner a liberal return if flowers are abundant. The ten frames taken from the old hive should be given to some other colony, care being taken to destroy the young queen cells. The colony that receives these ten frames will increase very much in number during the next fortnight, and, should

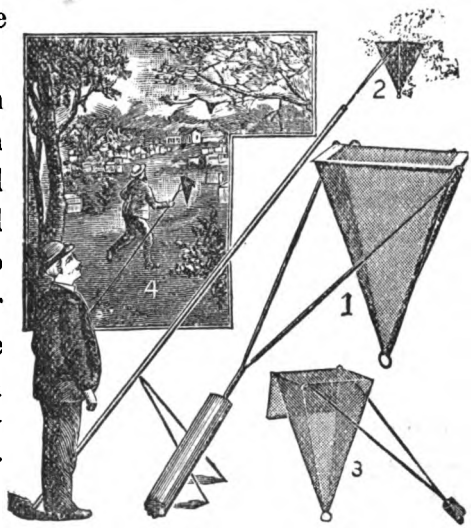


Fig 9. THE MANUM SWARM CATCHER.

(1) Wire cloth basket or cage closed.
(2) Position for receiving the bees as they cluster on the outside.
(3) The cage open.
(4) General view of swarm catching.

it swarm, the swarm will be larger than usual. The above short account will give the beginner a fair idea of what swarming is and how to take advantage of it. It should always be borne in mind that a swarm is a vigorous worker. Should a swarm cling to a branch 20 or 30 feet from the ground, the Manum swarm catcher (Fig. 9) should be used instead of the box. If the swarm is too high to reach with a catcher, the branch should be cut off with a saw and lowered carefully to the ground with a rope. To prevent the loss of bees a sheet is generally spread on the ground, and a kerosene box placed on that. If the queen falls on the sheet, she will readily find the box, otherwise she is likely to be lost in the grass. It should be remembered that bees seldom sting while swarming, and many bee-keepers do not use a veil in handling swarms. Artificial swarms can be made by experts, but beginners should not attempt to do this.

CLIPPING QUEENS' WINGS.

It is a common practice to cut the queen's wings to prevent her flying away with a swarm. The system of bee-keeping advo-

cated in this pamphlet does not require this practice. If the hive is surrounded by high trees it may be necessary to clip the queen's wings, especially if she be of special value. The queen is held between the thumb and forefinger, whilst her wings are clipped with a sharp pair of small scissors. She will not sting the operator. Queens may be bought with their wings clipped.

The clipping of the wings is inadvisable as a general rule, as it is not a certain preventive of swarming and the queen, on running out with a swarm, is apt to be lost in the grass.

A better method of procedure is to discourage swarming as far as possible as soon as the requisite number of colonies have been obtained, or to rely on Manum's swarm catcher when the bees do swarm. The practice of clipping the wings seldom gives such good results as those obtained by letting the bees act in their natural way and by utilising the swarming instinct to the best advantage. Where liquid honey and wax are produced, swarming can be very easily controlled.

LIQUID HONEY AND WAX PRODUCTION.

It is generally considered by northern bee-keepers that the production of wax alone will not pay. Usually books say little on the subject and the present production of wax is regarded merely as a by-product. There are however, situations in the West Indies where wax production should pay if rightly carried out. To produce wax, it is necessary that liquid honey only shall be prepared, the honey being extracted from the combs with a machine. As a rule two brood chambers or even three may be used in the hive, one above the other; the brood is restricted to the lower chamber by interposing between the lowest chamber and the next a perforated zinc honey board, which has holes large enough to allow the workers to get through, but not large enough for the queen. In this way, eggs cannot be laid in the upper chambers and the honey is not soiled by brood.

If these upper chambers are provided with frames *with one inch starters of foundation*, the bees will make combs, probably drone combs. When these are filled with honey and sealed over, they should be re-

moved and the honey extracted with a machine. The combs are then cut out of the frames with the exception of a one-inch strip in each. This remaining inch allows the bees a "starter" when the frames are replaced. The combs that have been cut out are then placed in the solar wax-extractor, which will melt them into wax of the highest possible quality. Wax produced in this way should command 5 or 6 cents per pound more in London than the best boiled wax.

When old combs are used, it is necessary to boil the wax in a hot-water or steam kettle. Hive manufacturers generally sell kettles for this purpose, with directions for their use. Wax obtained in this way should subsequently be remelted in the solar wax-extractor, which will improve its appearance.

The production of wax and liquid honey naturally go together. This method is best suited to outlying places where transportation is difficult, as honey can be put in barrels or kegs and easily sent long distances. Wax should be carefully wrapped in clean paper

(not newspaper) and packed in boxes or barrels without a speck of dirt on or in it.

The solar wax-extractor (Fig. 10) is simply a tin box with a glass cover, which, when exposed to the sun, will readily melt the wax. The first solar extractor needed should be purchased; others can be made like it to suit individual requirements. Old combs are better boiled in a Swiss or other hot-water extractor.

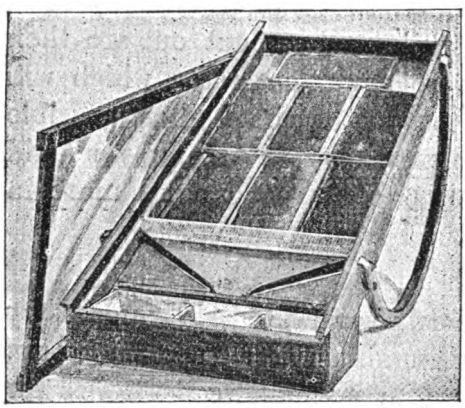


Fig. 10. THE SOLAR WAX-EXTRACTOR.

In the upper part the empty combs are placed, side by side. On exposing to the sun with the lid on the wax melts and flows into the receptacle at the base.

Liquid-honey extractors (Fig. 11) are quite simple in operation. Before putting in the combs, the cell cappings are shaved off with a

knife. This is best done over a barrel with wire cloth over one end, to allow the honey to drain into the barrel. These cappings make the best wax. The combs are then placed in the baskets of the extractor, the handle is turned and the honey flows out at one side. The baskets are then reversed, and the honey is removed from the other side. If the combs are then quite light, the honey has all been extracted.

Fig. 11. THE LIQUID HONEY EXTRACTOR

Combs may be used in the hive over and over again, but if wax is desired, they should be removed from the frames always leaving one inch as a "starter" for the bees to begin upon. If the highest possible quality of extracted honey is desired, soiled combs should not be replaced in the honey chamber, nor should the bees be allowed to breed in them.

COMB HONEY PRODUCTION.

Good comb honey requires more care in its preparation than liquid honey, but the results, when good, are far more satisfactory. A reputation for excellence can be built up when good comb is produced and the extra trouble involved is amply repaid. The main point to be observed consists in having the sections full of clean "Weed" foundation, or better, having a few sections in each super filled with comb to act as "baits." If the brood chamber is full of bees, and plenty of flowers are in bloom, the bees will rush to fill the sections. After they have been at work for about a week, another super should be slipped on. When they take vigorously to work on the top super, a third may be put on top of it. When the last is partially filled examine the lowest; should the sections be nicely finished off, take it off,

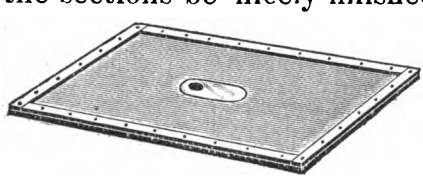


Fig. 12. Bee Escape Board.

place the two upper supers on the brood chamber and place the filled super on top,

with a bee escape board (Fig. 12.) between it and the lower supers. Replace the top of the hive and leave it so all night. In the morning the top super can be taken off free of bees, the bees having gone down to the lower supers. If 28 sections are taken off probably four will be unfinished. These are used as "baits" in the empty supers. The remaining sections after a little cleaning are ready to be disposed of.

In sending sections long distances, they should be packed in crates (Fig. 13). Glass is sometimes inserted in the sides of the crate to allow of easy inspection and to compel the careful handling of the crates during transit. When shipped very long distances, several crates should be sent together.

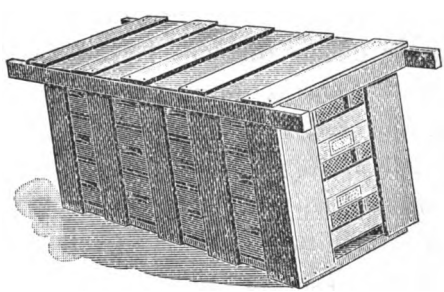


Fig. 13. SHIPPING CRATE.

It is well to look after the transportation of honey personally as far as possible, to avoid

rough handling. Crates can be obtained from hive manufacturers very cheaply.

COMB FOUNDATION.

One of the happiest inventions ever made for the benefit of bee-keepers was the machine for making comb foundation. It was invented by Mehring, a German mechanic. Comb foundation is simply a sheet of bees-wax stamped so as to resemble the base of a comb. So strong is this resemblance that when inserted into the hive the bees at once see the value of it and proceed to build their comb on it. Being made in fine flat sheets the combs are perfectly flat, much flatter than natural combs are likely to be. All beekeepers now use it. Its most valuable quality is the control it gives over drone production. Left to their own devices, the bees will build a large amount of drone comb wherein the queen will lay drone eggs, the result being a far larger number of drones than is required. There are 16 drone cells to a square inch of comb, and of worker cells there are 28. It is the practice where a large proportion of worker bees are wanted

to insert comb foundation with 28 cells to the inch. The bees build this up into worker comb and a large production of drones is thereby prevented.

Where honey in the comb is wanted in small pieces it is usual to put on the hive supers, each containing 28 pound boxes or sections. If these are put on the hive as they are, the bees will refuse to build comb in so small a space, but the moment a sheet of comb foundation is inserted in each box the bees adopt a different attitude and proceed to build it into comb, and once having built the comb, will naturally store the honey in it.

For these reasons, the West Indian bee-keeper is urged to use full sheets of foundation in the brood frames and full sheets also in the sections intended for comb honey. Some bee-keepers have adopted the plan of inserting small pieces of foundation termed "starters" for the purpose of getting the bees to work; this is not recommended. It is better to use the foundation liberally at the start and get good straight worker combs. Bee-keepers who resort to starters have to

adopt drone traps and other devices to keep down the drones, forgetting that drones are very voracious creatures even while in the cell in a growing state, and that they will lose in a week's time as much honey as would have paid for the comb foundation, which may last 20 years if not longer.

The old plan of making comb foundation was to dip thin boards into melted wax, draw them out to cool and peel the adhering wax off in a sheet. This plan is almost now obsolete being replaced by the "Weed" process. In this a large block of wax is placed under heavy rollers which laminate the wax into sheets of the desired thickness. A tougher and thinner sheet is the result of this method, also it is faster in operation. It has been found far better to sell wax at a fair price, say 1/6 per pound and buy "Weed" foundation at 2/ per pound. If wax does not sell for 1/6, then the foundation will also be less in price. Taking this view of it, it does not pay anyone to make foundation at home. Fears have been expressed that foundation in the West Indies would not keep. It will keep for years in a cool place.

It is a common practice where strong combs are wanted to embed in the foundation light tinned wires. When inserted in the frames these wires tend to prevent the comb breaking when roughly handled. The Van Deusen foundation is made with the wires in it, but labours under the disadvantage of having the base of the cells flat bottomed. It is however a good kind of foundation for some purposes.

Fig. 14. shows the method of attaching the foundation to the frames with a Daisy roller.

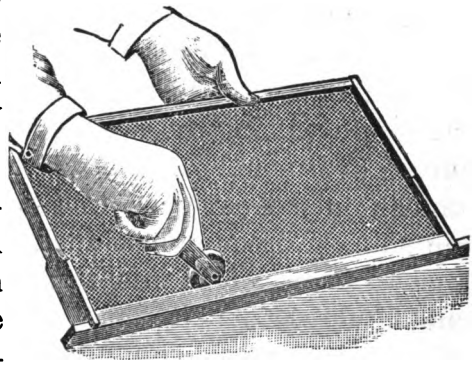


Fig. 14. HOFFMAN FRAME.

To illustrate also the method of inserting comb foundation.

Small machines called foundation fasteners are used to attach the foundation to sections. The small sheets to be put into sections are $3\frac{3}{8}$ inches

by $3\frac{3}{8}$ inches, that is, if the section used is the $4\frac{1}{4}$ inches by $4\frac{1}{4}$ inches or pound section.

To fit the comb foundation into the frames, first remove the wedge shaped strip of wood which should be found in one of the grooves inside the top end of the frame. Then slip the foundation into the groove nearest the centre of the frame and fasten it securely in position by pushing the wedge strip back into its original place.

If wired frames have been ordered four holes should be found bored in the side bars of each, and the following directions carried out before putting the foundation in position. Drive two small tacks part-way in, about half an inch from each of the end holes on one side. Thread fine tinned wire (No. 30) backwards and forwards through the holes, and wind one end to one of the tacks and drive it home. Carefully pull the wire tight and fasten the other end to the second tack and drive that in also. Put the foundation in place as before, and obtain a smooth board, about $\frac{7}{8}$ inches thick, just fitting inside the frame. Lay the frame down flat so that the

foundation is supported by the board, and press the wires into the foundation.

ROBBER BEES.

When honey is scarce bees will sometimes rob one another, getting into desperate fights and killing each other by the thousand. Should this happen, the entrance to each hive may be made smaller. The particular colony of bees attacked should be removed for two days and an empty hive put in its place to deceive the robbers. Bees can be trained to robbery by leaving bits of honey where they can readily find it. When the honey is all gone they will pounce on some weak colony and rob it. The moral is *never leave bits of honey lying about.*

In feeding bees in the tropics care should be taken to feed only as much syrup as the bees can consume overnight, also feeding them in the evening as late as possible, otherwise the smell of syrup is apt to attract neighbouring bees and lead them to commence robbing practices.

THE VALUE OF BEES TO FRUIT GROWERS.

The value of bees in pollinating fruit blossoms can hardly be over-estimated. Elaborate experiments have been made which prove the value of bees to fruit growers. Unless the flowers are rendered fruitful by the visits of insects there is seldom a full crop. Bees are the best insects for this purpose. If a fruit tree is carefully watched it will be observed, if there are bees in the locality, that for every other insect present there will be perhaps a dozen bees. The finer varieties of fruit require more attention from the bees than the common or wild fruits. The growers of fine pears in the United States have been compelled to keep bees so as to ensure a crop of fruit, and growers of melons and cucumbers who grow fruit in glass houses have to keep bees or they get little or no fruit. The idea that bees are injurious to fruit has been thoroughly exploded.

The value of bees to fruit production is easily understood. They carry the pollen from the male to the female flowers. True, they carry away some of the pollen to feed

the young bees, but nature has been bountiful and furnishes much more pollen than the plants actually require.

USES OF HONEY.

The uses of honey are manifold. It is used in the preparation of first class confections. It is better than sugar for sweetening preserved fruit. A mixture of butter and honey is said by French doctors to be superior to cod liver oil for invalids. It is by far the safest sweet to give children. For pulmonary complaints doctors recommend it. Having been partially digested by the bees it is good for persons with a weak digestion. It will keep for a hundred years in an ordinary bottle and come out just as fresh as when it went in. It requires no cooking or any preservative. It is nutritious food. Honey and milk together form a perfect food for man. It is also a medicine, especially particular kinds gathered from certain flowers. It is easily tested for adulteration. Good honey gets solid when exposed to cold it is therefore a simple matter to put honey in a refrigerator a few days and see if it gets solid. If it remains liquid it may be reasonably

suspected of adulteration. Honey improves with age, inferior honey will generally improve by being kept. Vinegar made from honey is the best procurable.

EXPORTING LIQUID HONEY.

Liquid honey for export should never be put up in bottles, either barrels or tins (but scrupulously clean) should be used. Rum or beer barrels, if quite sweet, answer very well. Tins, especially clean kerosene tins, are considered excellent packages for honey, both in London and New York Honey so put up commands a higher price than in wooden barrels. An ideal package for honey is shown in Fig. 15, which, if necessary, can be obtained from New York.

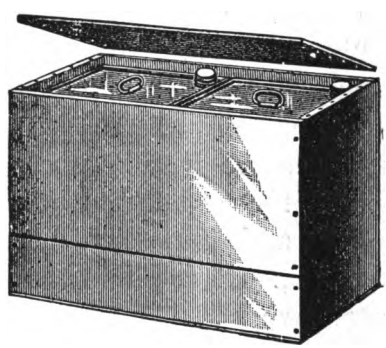


Fig. 15. Box to hold two sixty-pound cases of liquid honey.

ENEMIES OF BEES.

There are quite a number of enemies of

bees in the West Indies but only two call for special attention, the frog and the bee moth. The large frog or *crapeau* is a voracious eater of bees and will consume bees almost as fast as they alight on the entrance board of the hive. Luckily there is an easy remedy ; it is simply to keep the hive two feet from the ground on a platform. Poultry netting around the apiary will also keep them away. The moth is a troublesome enemy but almost as easily circumvented. Langstroth's remedy was "keep your colonies strong" for it is only in weak stocks that the moth does such harm. All bee-keepers should carefully look through their hives every few weeks to see if moths or moth eggs are in the hive. Should there be any such remove them and at the same time find the queen. If the latter seems to be all right, feed the colony a little. They will turn round and expel the moths from the hive and increase the number of bees so that all combs are protected by young bees. Moths lay their eggs in combs uncovered by bees. If empty combs are kept in the house these should be secured so that the moths cannot get at them. A few balls of napthalene are excellent preventa-

tives. The energetic bee-keeper is very little troubled with moths. Neglect is the prime cause of moths destroying a colony of bees.

DISEASES OF BEES.

In the islands for which this pamphlet is primarily intended there are practically no bee diseases worth mentioning. *To continue this desirable state of affairs it is absolutely necessary that no hives of bees be imported from foreign countries.* In Cuba, disease is rampant and a great drawback to successful bee-keeping. If any one is desirous of improving their bees, it may be accomplished by the importation of pure bred Italian queens from good breeders. *There is not the slightest necessity to import bees and it is to be hoped no one will attempt it except under expert advice from the Department of Agriculture.*

AXIOMS FOR BEE-KEEPERS.

Keep your colonies strong.

Keep a record of the age of all your queens.

Bees filled with honey never want to sting.

When honey is being freely gathered, there is little danger from stinging.

Smoke compels bees to fill themselves with honey.

Do not make quick movements close to a hive; be most deliberate; never jar anything with bees on it.

Having many swarms means little honey.

Queenless colonies are a prey to all enemies.

Keep up to date by reading good bee journals.

Keep a careful record when honey flowers commence to bloom, it will be valuable in future use.

Keep your hives shaded from the midday sun and face them eastward.

In the West Indies use the largest sized hives. (Barbados is an exception to this rule).

BOOKKEEPING FOR BEE-KEEPERS.

If the highest success is to be attained in bee-keeping it is necessary that the bee master keep an accurate record of his hives. It will be found that some stocks give much better returns than others; for this reason it is well to breed only from such colonies; by this means the strain of bees will be improved. The age of every queen should be known. When a queen gets to be two years of age she should be removed and replaced by another and it is useless to attempt to keep such knowledge in one's memory. Bees only live 4 or 5 weeks and to replace this constant drain of working force a vigourous young queen is required. A queen will live four or five years but after the second year rapidly declines in laying value, hence the importance of a record. A small slate under the roof of every hive is an excellent record where only a few are kept. On this should be kept the age of the queen, her pedigree, and the condition of colony when last examined.

A book for the purpose of keeping a record of 100 colonies of bees is published

by George W. York, publisher of the *American Bee Journal*, 144, Erie Street, Chicago, Illinois, U.S.A. The slates can be purchased from the A. I. Root Co.

BOOKS ON BEES.

A large number of books have been devoted to the study of the bee, but a few only are of value at the present time. Among the long list of eminent men who have devoted themselves to the subject, Huber stands first. Next in order comes Langstroth, whose book is no less valuable than his hive. If possible one of the earlier editions of the book should be read, as well as that revised by Dadant. No bee-keeper, who aspires to breed queens, should do so without Dzierson's book on the *Theory of Parthenogenesis in Bees*. For practical use, one at least of the following should be obtained:—

Bees and Bee-keeping by F. Cheshire. (L. Upcott Gill, Strand, London).

The Honey Bee by Cowan. (Houlston & Co., London.) This deals chiefly with the structure of the honey bee.

The Hive and Honey Bee by Langstroth revised by Dadant.
(Dadant, Hamilton, Hancock Co. Illinois, U.S.A.)

Manual of the Apiary by Professor Cook.
(Cook, Pomona, California or A. I. Root Co., Medina, Ohio, U.S.A.)

A.B.C. of Bee Culture by A. I. Root.
(A. I. Root Co., Medina, Ohio, U.S.A.)

A Year among the Bees by Dr. C. C. Miller.
(A. I. Root Co., Medina, Ohio, U.S.A.)

Queen Rearing by Doolittle.
(G. W. York, American Bee Journal, Chicago, Illinois, U.S.A.)

Queen Rearing by Henry Alley.
(G. W. York, American Bee Journal, Chicago, Illinois, U.S.A.)

Everyone who hopes to make money by bee-keeping should subscribe to a bee-journal, even if it be only to find out where to sell his honey to the best advantage.

The following include the most prominent journals devoted to bee-keeping:—

The British Bee-keeper published at King's Langelly, Herts, England.

Gleanings in Bee Culture published by the A. I. Root Co., Medina, Ohio, U.S.A. (Semi-monthly).

American Bee Journal, Chicago, Illinois, U.S.A. (Weekly).

The American Bee-keeper, Falconer, Jamestown, New York State, U.S.A. (Monthly).

The Bee-keepers' Review, Flint, Michigan, U.S.A. (Monthly).

HIVE MANUFACTURERS.

Goold, Shipley and Muir Ltd., Brantford Canada.

A. I. Root Co. Medina, Ohio, U.S.A.

W. I. Falconer, Jamestown, New York, U.S.A.

G. B. Lewis Co., Watertown, Wisconsin, U.S.A.

BREEDERS OF PURE ITALIAN BEES.

A. I. Root Co., Medina, Ohio, U.S.A. (who also sell queens direct from Italy).

G. M. Doolittle, Borodino, New York, U.S.A.

J. B. Case, Port Orange, Florida, U.S.A.

DEALERS IN HONEY AND WAX.

John Haddon & Co., Bouverie Street, London, England.

W. L. Sladen, Ripple Court, Dover, England.

F. H. Leggett & Co., Franklin Street, New York.

Hildreth and Segelken, 120, West Broadway, New York.

Charles Israel & Brothers, 486, Canal Street, New York.

MAKERS OF COMB FOUNDATION.

Goold, Shipley & Muir, Brantford, Ontario, Canada.

A. I. Root Co., Medina, Ohio, U.S.A.

Dadant & Son, Hamilton, Hancock Co., Illinois, U.S.A.

Van Deusen & Sons, Sprout Brook, New York, U.S.A.

BEE-FLOWERS OF THE WEST INDIES.

Acacias, various species.

Agave. American aloe. AGAVE, various species.

Angelin. Bastard Cabbage. Walnut (Antigua). ANDIRA INERMIS.

Avocado pear. Alligator pear. *Avocat* (Fr.), *Zabaca* (Fr.), PERSEA GRATISSIMA.

Banana. *Banane figue* (Fr.) MUSA SAPIENTUM.

Bois immortel. ERYTHRINA UMBROSA.

Cassia. *Casse* (Fr.) CASSIA various species.

Christmas wreath. Christmas gambol, Bell-flower. "Campanula" (Cuba.) IPOMAEA SIDAEFOLIA.

Citron. *Citronnier* (Fr.) CITRUS MEDICA.

Cotton. *Cotonnier* (Fr.) GOSSYPIUM BARBADENSE and other species.

Cucumber. *Gros concombre* (Fr.) CUCUMIS SATIVUS.

Eucalyptus, various species.

Fiddle wood. *Bois côtelette* (Fr.) CITHAREXYLUM QUADRANGULARE.

Galba. Santa Maria (Jamaica). *Palo Maria* (Sp.), CALOPHYLLUM CALABA.

Gourd. *Potiron* (Fr.), CUCURBITA MAXIMA.

Guava. *Goyavier* or *Goiave* (Fr.) PSIDIUM GUAJAVA.

Hog-plum. *Monbin* (Fr.) SPONDIAS LUTEA.

Lantana. Rock sage. *Sauge* (Fr.), LANTANA, various species.

Lignum Vitae. *Gaiac* (Fr.) GUAIACUM OFFICINALE.

Lime. *Citron.* (Fr.) CITRUS MEDICA, var. ACIDA.

Locust. Courbaril. Simiri (St. Lucia and British Guiana) HYMENAEA COURBARIL.

Logwood. *Campêche* (Fr.), HAEMATOXYLON CAMPECHIANUM.

Loquat. *Néflier du Japon* (Fr.), ERIOBOTRYA JAPONICA.

Mahagony. *Acajou* (Fr.), *Caobo* (Sp.). SWIETENIA MAHAGONI.

Malacca apple. Malay apple. Large rose apple. *Pomme d'Haiti* (Fr.). *Pomme d'amour* (Fr.) EUGENIA MALACCENSIS.

Manchineel. *Mançenillier* (Fr.) *Mançanilla* (Sp.) HIPPOMANE MANCINELLA.

Melon. CUCUMIS MELO.

Muskmelon. CUCURBITA MOSCHATA.

Nutmeg. *Muscade* (Fr.) MYRISTICA FRAGRANS.

Ochro. *Gombo* (Fr.) HIBISCUS ESCULENTUS.

Orange. *Oranger* (Fr.) CITRUS AURANTIUM.

Plantain. *Banane* or *Bananier* (Fr.) MUSA SAPIENTUM var PARADISIACA.

Pumpkin. *Giromont* (Fr.) CUCURBITA PEPO.

Raspberry. Redberry (Dominica). *Fraise* (Martinique) RUBUS ROSAEFOLIUS.

Rose apple, *Pomme rose* (Fr.) EUGENIA JAMBOS.

Rosemary. *Croton*, species.

Seaside grape. *Raisinier bord de mer* (Fr.) COCCOLOBA UVIFERA.

Shaddock. Pumelo. Grape-fruit. *Chaddok* (Fr.) *Fruit defendu* (Fr.) CITRUS DECUMANA and varieties.

Silk cotton. Ceiba. *Fromager* (Fr.) ERIODENDRON ANFRACTUOSUM.

Spanish ash (Barbados). GLIRICIDIA MACULATA.

Squash (a variety of the pumpkin). CUCURBITA PEPO var.

Sugar-cane. SACCHARUM OFFICINARUM

Sweet potato. *Patate douce* (Fr.) IPOMAEA BATATAS.

Tamarind. *Tamarinier* (Fr.) TAMARINDUS INDICA.

Tobacco. *Tabac* (Fr.) NICOTIANA TABACUM.

Vervain. STACHYTARPHETA INDICA.

Verveine courante (Fr.), LIPPIA REPTANS.

Water melon. *Citrouille* (Fr.) CITRULLUS VULGARIS.

Willows (so called in Barbados). CAPPARIS, species.

GLOSSARY.

Alighting board. The projecting board on which the bees alight before entering the hive.

Apiary. A number of hives.

Apiculture. The science of keeping bees.

Artificial swarm. A swarm made by a bee-keeper.

Bar frame. The hanging Langstroth frame.

Bee escape. A device for freeing a

super from bees. The bees can get out of the super but cannot return.

Bee space. A sufficient space to allow one bee to pass, *i.e.* $\frac{1}{6}$ of an inch.

Black brood. A contagious disease of bees.

Brood. Young bees still in their cells.

Brood comb. The comb used solely for rearing bees.

Capped brood. Cells, in which the young bee has reached the "chrysalis" stage and been covered over.

Capped honey. Honey comb covered with wax.

Carniolian bees. A race of bees peculiar to Carniola, in Austria.

Cell. The hexagonal division in which brood develops or honey is stored.

Chyle food. Food elaborated by the bees for feeding brood.

Chrysalis. The last stage of the life-history, before the perfect insect

emerges. More correctly termed "pupa."

Colony. A swarm of bees; several bees with one queen.

Comb foundation. An artificially prepared sheet of wax, stamped with the beginning of cells.

Comb honey. Honey as produced by the bees; usually prepared in small boxes, called "sections."

Cyprian bee. A yellow bee similar to the Italian, native of Cyprus.

Division board. A small board, the same size as a frame, used to contract the size of a hive.

Entrance blocks. Small pieces of wood used to contract the hive entrance.

Extracted honey. Liquid honey extracted from the combs with a centrifugal machine.

Extractor. A machine for removing honey from the comb without injury to the latter.

Feeder. A receptacle for the syrup used for feeding bees.

Fixed frames. Frames automatically spaced the right distance apart.

Foul brood. A malignant bee disease.

Frame. Four small bars of wood nailed together to hold one comb.

Honey comb. The double layer of cells in which bees rear brood or store honey. Worker comb has 28 cells to the square inch, each side. Drone comb has 16.

Honey knife. A double edged, bevelled knife for removing the cell cappings of comb, to allow of the extraction of the honey.

Hybrids. A term incorrectly applied to a cross breed between such varieties as black bees and Italians.

Italian bee. The bee of northern Italy, erroneously termed Ligurian.

Italianizing. Changing a colony of bees from the common sort to Italians,

by the substitution of an Italian queen.

Laying worker. A superior sort of worker having the power to lay (drone) eggs.

Nectar. The sweet secretion of flowers, which is made into honey by the bees.

Nurse bees. Young bees whose duty it is to feed the brood.

Pollen. The powdery substance contained in the stamens of flowers.

Queen bee. The mother bee, the only full grown female in a colony of bees.

Queen cage. A small box of wood and wire, used to hold a queen and her 25 to 50 attendant bees ; often sent by post.

Queen cell. A large cell, resembling half a peanut, in which the queen is hatched and reared.

Quinby frame. A frame resembling

the Langstroth, but "sitting" instead of "hanging" in the hive; size 18½ inches by 11¼ inches.

Ripe honey. Honey that has been closed up in the cells and is sufficiently thick not to ferment.

Robbing. Bees invading other hives to rob; done only when flowers are scarce.

Royal jelly. Food elaborated by the bees for feeding young queens.

Section. A small frame to hold a pound of honey in the comb.

Separator. A thin slip of wood or tin, placed between the sections to insure regular comb building.

Solar extractor. A wooden tin-lined box, used to melt wax with the heat of the sun.

Starter. A small piece of comb foundation inserted as guide to the bees in comb building.

Super. A box for holding sections above the brood chamber.

Swarm. A large number of bees, led by a queen, who leave the hive and settle on a branch near by.

Tested queen. One whose progeny show pure markings.

Transferring. The operation of removing bees from a box to a modern hive.

Unripe honey. Thin honey not sufficiently evaporated.

Wax. A fatty substance extracted by the bees from honey or sugar. It is supposed that only young bees make wax.

Worker bee. An undeveloped female bee, often erroneously termed a "neuter."

Worker egg. A female (fertilised) egg, which will produce either a worker or a queen according to the food administered by the bees.

OUTFITS FOR BEE-HIVES,

SELECTED FROM THE CATALOGUE OF A. I. ROOT CO.

Order for one hive, etc.

	$ c.
One two-story 10 frame hive for comb honey ...	2·45
100 one pound plain sections	50
1 lb. of brood foundation (Light weight) ...	50
1 lb. of section foundation	50
One smoker, Bingham	75
Veil	50
Book, Cook's *Manual of the Apiary*, or Langstroth on *the Honey Bee*	1·25
	$ 6·45

If two hives are ordered, add $2.45 to the above cost.

Order for five hives.

	$ c.
5 two-storey 10 frame hives for comb honey ...	10·75
500 plain sections	1·50
5 lbs. light weight brood foundation	4·40
2 lbs. „ „ section „ (extra thin)...	1·20
1 smoker, Bingham	75
Veil	50
Book *(A.B.C. of Bee Culture)*...	1·00
Parker foundation fastener	25
Spur wire embedder...	15
¼ lb. of tinned wire	10
Foundation roller	15
Manum swarm catcher	80
Porter bee escape board	35
5 Simplicity feeders	25
Bee gloves (not rubber)	50
	$ 22·65

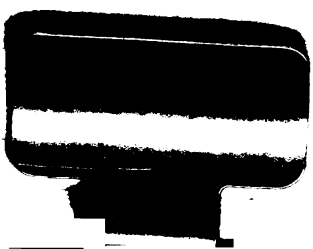
Order for 5 hives for extracted or liquid honey.

	$ c.
5 two-story 10 frame hives for extracted honey ...	8·50
1 Cowan honey extractor	10·00
5 lbs. light weight brood foundation	4·40
1 Bingham smoker	75
1 Veil	50
1 Swarm catcher	80
1 pair bee gloves (not rubber)...	50
	$25·45

N.B.—This is an ideal outfit for a beginner.

Order for 25 hives.

	$ c.
25 one-and-a-half stories for comb honey 10 frame...	35·00
25 extracting supers with frames $5\frac{3}{8}$in. deep ...	7 50
25 lbs. brood foundation light weight	11·25
10 lbs. extra thin foundation for sections ...	5·60
2,000 Sections	6·00
Cowan extractor	10·00
Daisy foundation fastener (without lamp) ...	70
Bingham uncapping knife	70
Comb bucket	1·25
Boardman solar wax extractor...	7·50
10 Tinker honey boards for 10 frame hives ...	2·20
4 Porter bee escape boards	1·40
10 Shipping cases for sections	1·50
1 Smoke engine (Bingham)	1·25
Foundation roller	15
10 Simplicity feeders	50
1 Globe bee veil	1·00
Book, *A. B. C. of Bee Culture* or Cook's *Manual*, or Langstroth *on the Honey-Bee*	1·25
1 lb. of tinned wire	25
Bee brush	15
Bee gloves (not of rubber)	50

To start 25 hives, at least five swarms of bees ought to be purchased. These will usually cost $1 each.

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